REMARKS:

The claims in the application are 21-52 and Claims 53-55 added by the present amendment.

Favorable reconsideration of the application as amended is respectfully requested.

In the interest of clarity, the following Remarks will address the various matters raised in the Office Action under the following subheadings I-VII (reference will be made to preferred embodiments of the present invention illustrated in the drawings of the present application):

I. Allowable Subject Matter

In paragraph 24 of the Office Action, the Examiner has suggested recitation be inserted into the claims to be allowable. This recitation has been introduced as dependent Claim 54 with the following revision. The second paragraph of Claim 54 recites the device is structured and arranged to allow heterodyne detection of a single optical channel with defined wavelength without spatial separation from other optical channels of different wavelength. This is a more accurate recitation of the present invention. In other words, in the inventive device, all optical channels strike the detector 40, but modulation of the channels will be visible and detectable by the heterodyne method for only one selected channel. Similarly, if a spectrometer is used, light of all incoming wavelength will strike the detector 40 at the same time, but only light of the selected wavelength will show the specific modulation to be detected.

II. Withdrawn Claims

It is respectfully submitted Claims 24 and 31, which have been withdrawn from consideration in paragraph 1 of the Office Action, also read upon the elected embodiment of Fig. 2 for the following reasons. Claim 24 recites presence of a local light source. None of the embodiments illustrated in Figs. 2-4 include a local light source, so Claim 2 is generic to all these embodiments and should be examined at this time..

Claim 31 recite presence of a wavelength-dependent element, i.e., a spectrally dispersive or diffractive element which is a frequency or phase modulator at the same time. The dispersive element in the interferometric setup according to the present invention can be a prism 12 (Fig. 2) or grating 11 (Fig.3). Accordingly, Claim 31 also reads upon the elected embodiment of Fig. 2 and should be examined at this time.

III. Objection to the Drawings

Concerning the objection to the drawings raised in paragraph 3 of the Office Action, proposed Fig. 5 is enclosed herewith and illustrates a coupler (Claim 22). Approval of the enclosed Fig. 5 for entry into the present application is respectfully requested by the Examiner; an appropriate formal drawing will be submitted upon payment of the issue fee.

Concerning Claim 23, it is respectfully submitted the figures in the present application already show all three features (i)-(iii) together, for the following reasons. More specifically, recitation of the phase/frequency shifter/modulator constitutes the overall functioning of the inventive device. Using

a movable mirror 20 as illustrated in Figs. 2 and 3 accomplishes all these functions. Depending upon the type of movement of the mirror 20, the following results: single, continuous movement in a single direction causes phase-shift, useful for measuring intensity of incoming light as a single wavelength or adjusting the device; periodic movement of the mirror 20 causes phase-modulation, used for heterodyne detection; periodic "saw-tooth" or "zig-zag" type movement of the mirror 20 generates a particular kind of phase modulation which results in frequency shift (such "saw tooth" functioning is illustrated inside modular control element 60 in Figs. 2 and 3); furthermore, changing the time period of the "saw tooth" modulation will also result in frequency-modulation.

Accordingly, all four modes of operation are accomplished by the same optical element, i.e., the moving mirror 20 shown in Figs. 2 and 3. The travel distance 90 is already illustrated in Fig. 4, so it is respectfully submitted there is no need to provide a single figure showing all recited components together (please contact the undersigned attorney should there still be any question in this regard).

A proposed correction to Fig. 2 is enclosed on which an arrow has been inserted in red ink showing prism 12 is rotatable or tiltable as recited in Claim 34. Approval of this drawing correction is also requested by the Examiner, with a corrected formal drawing being submitted after a Notice of Allowance.

Claim 41 has been clarified with Claim 53 introduced to clarify the confusion concerning illustration of these features. More specifically, Claim 41 has been amended to recite the detector 40 constitutes an optical receiver or spectrometer, while Claim 53 recites the detector 40 constitutes an optical

modulator, thereby eliminating this drawing objection. Furthermore, it is respectfully submitted the explanation *supra* clearly point out all features recited in Claim 34 are presently found in the drawings of the present application. Additionally, the left arrow in Fig. 2 clearly denotes the source of incoming light, i.e., reference light, which finally reaches detector 40 with demodulator 50.

IV. Objection to Specification, Claims and Abstract

The specification has been amended to eliminate the objections raised in paragraph 5 of the Office Action. It is respectfully pointed out the Abstract had been previously replaced in the amendment filed May 13, 2002 in the above-identified application. Claims 21, 22, 34, 38 and 40 have also been amended to eliminate the objections raised in paragraph 7 of the Office Action.

V. Enablement Rejections Under 35 U.S.C.§112, First Paragraph

In response to the enablement rejection raised in paragraph 9 of the Office Action, it is respectfully pointed out all three possibilities (i)-(iii) of frequency shift, phase shift and time displacement can be used at the same time. The operating principles of the present invention are based on heterodyne (or more precisely homodyne) detection of the signal. As addressed *supra*, frequency and phase shift are strongly linked together, depending upon mode of operation of the phase shifting device. In most common methods of heterodyne detection, a phase shifter is used to shift frequency by phase-modulation. To detect spectral lines with narrow bandwidth, i.e., a long coherence length, interferometric arrangements having different optical path length in the two arms

of the interferometer, i.e., a phase shift of many wavelengths, may be used (termed time displacement). Such time displacement (iii) is commonly used in addition to phase modulation according to features (i) or (ii), to detect signals with high coherence length, e.g., laser light.

Therefore the features recited in Claims 21-23, 27, 28, 30, 33, 34 and 38-45 can be easily practiced by one skilled in the art by considering the disclosure found in the present application, so the present application quite definitively constitutes an enabling teaching of these features. Additionally, Claims 22 and 23 have been amended in accordance with the suggestions in paragraphs 10 and 11 of the Office Action, while Claims 44, 45 and 50 have been amended in accordance with the suggestions in paragraphs 12 and 13 of the Office Action, to eliminate the enablement rejections raised in those paragraphs.

VI. Claim Language Rejection Under 35 U.S.C. §112, Second Paragraph

As pointed out *supra*, the possible combinations of features (i)-(iii) recited in the requisite independent claims, are not unduly broad or indefinite, as asserted in paragraph 15 of the Office Action. Additionally, the requisite independent claims have been clarified to recite all of these features (i)–(iii) relate to the optical signal to be detected, to eliminate the confusion noted in paragraph 16 of the Office Action. Claim 30 has been amended to more closely correspond with original Claim 8 to eliminate the confusion noted in paragraph 17 of the Office Action. Furthermore, Claim 50 has been amended as requested in paragraph 18 of the Office Action. In this regard, it is respectfully submitted

there is no further need to amend Claim 50 to correspond with Claims 21 and 22 because these three claims are all independent claims and must therefore be considered separately. Independent Claim 50 is directed to the specific arrangement illustrated in Fig. 2 , with the source of reference light ray denoted by the left arrow in that figure.

VII. Prior Art Rejection

Claims 21, 27, 28, 30, 33, 38, 39, 41 and 42 have been rejected under 35 U.S.C. §102 as being anticipated by U.S. Pat. No. 3,469,923 to Mertz or Hecht et al "Optics," (1974), pp. 37-38, 62-65, 189-190 and 286-290 in paragraph 20 of the Office Action, while Claims 34 and 40 have been rejected under 35 U.S.C.§103 as obvious over these two references in paragraph 22 of the Office Action. It is noted Claims 22, 23, 43-45 and 50 have not been rejected over any art; accordingly, it is respectfully submitted these claims should now be in condition for allowance. However, it is respectfully asserted all claims pending herein are patentable over this combination of art, for the following reasons.

The present invention provides a new device having the following combination of features:

an interferometric arrangement (e.g., a Michelson, Mach-Zehnder interferometer);

means for modulating one of the rays brought to superposition (phase, frequency, time);

heterodyne detection; and

the angle of the beams depending upon wavelength. Any deviation of the beams inside the interferometer caused by a dispersive element will disturb the interference pattern and inevitably inhibit heterodyne detection. Therefore, introducing an additional angular dispersive element inside the interferometric setup combined with heterodyne detection, is neither taught nor suggested in the prior art, because in any conventional interferometric setup, a spectrally dispersive element, especially an angular dispersive element, will prohibit heterodyne detection.

However, the presently claimed invention takes advantage of just such a disturbing influence. More specifically, by choosing a suitable modulation technique and adjustment of the interferometric arrangement, the thus-introduced dispersive element prohibits heterodyne detection by disturbing the interference patterns, except for a single, well-defined wavelength. Examples of the resulting interference patterns are illustrated in Fig. 1 of the present application. Signals at the single selected wavelength will produce interference patterns shown in Figs. 1a and 1b and which are detectable by heterodyne detection, signals at other wavelengths result in interference patterns as shown in Figs. 1c and 1d which result in a certain intensity at the detector but will not be detected by using heterodyne detection methods.

The features of the presently claimed invention and accompanying advantages attained thereby, are neither disclosed nor suggested by the applied art, for the following reasons. Mertz shows an interferometric approach to measure weak, narrow spectral lines by using a heterodyne detection method. There is no dispersive element in this reference; introducing such a dispersive element would cause deviations of the beams inside the interferometer, disturb the interference pattern and inhibit heterodyne detection. Such modification would be incompatible with the device taught in Mertz.

Hecht et al describe interferometric setups, but do not show or suggest presence of dispersive interferometers. To the contrary, on page 287 when explaining the Michelson Compensator Plate, Hecht et al explicitly stress that in interferometric setups for polychromatic light, any dispersion must be avoided. Any spectrally dependent variation of beam angles (angular dispersion) must be avoided. The Michelson Compensator Plate is a plan parallel glass plate specifically designed not to change the angle of the beam. The Compensator Plate corrects for the spectral variation of the optical path length introduced by the beam splitter plate. Michelson's famous experiments were made possible because he not only avoided any angular dispersion by using planar elements, but was also able to correct the dispersion path length by introducing compensation.

Accordingly, if anything, Hecht et al actually teach away from the presently claimed invention. Furthermore, it is even acknowledged on page 11 of the Office Action that Mertz fails to teach a wavelength dependent element, with Hecht et al then being relied upon. However, this reliance is improper in

fashioning an anticipatory rejection where a single reference must show all the claimed features.

The remaining art of record has not been applied against the claims and will not be commented upon further at this time.

Accordingly, in view of the forgoing amendment, accompanying remarks and explicit statements in the Office Action, it is respectfully submitted all claims pending herein are in condition for allowance. Please contact the undersigned attorney should there be any questions. A petition for an automatic three month extension of time for response under 37 C.F.R. §1.136(a) is enclosed in triplicate, together with the requisite petition fee and fee for additional claims introduced herein.

Early favorable action is earnestly solicited.

Respectfully submitted,

George M. Kaplan
Registration No. 28,375
Attorney for Applicant(s)

DILWORTH & BARRESE LLP.
333 Earle Ovington Blvd.
Uniondale, NY 11553
(516) 228-8484